



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

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CHICAGO, IL 60604-3590

EPA Region 5 Records Ctr.



227718

REPLY TO THE ATTENTION OF C-14J

March 12, 2001

VIA FACSIMILE AND U. S. MAIL

Mr. Mort P. Ames  
City of Chicago  
Department of Law  
Room 900  
30 North LaSalle Street  
Chicago, Illinois 60602-2580

Re: Lindsay Light Radioactive Waste Questions

Dear Mr. Ames:

Thank you for your letter of January 3, 2001 inquiring about the regulation of radioactive wastes, the nature of the Lindsay Light Company thorium contamination in Streeterville and radiation cleanup standards and your more recent e-mail inquiries about U.S. EPA's thorium detection methods, exposure standards, response actions and the role of the Illinois Department of Nuclear Safety. We hope that this letter and our discussions over the last several weeks adequately answer your questions about this complex area of environmental regulation.

Your January 3, 2001 letter inquired into the nature of the thorium contamination in the Streeterville area and how it is distinguished from naturally occurring thorium. Normally, processed radioactive materials have a different composition than unprocessed materials because some constituents were removed to enhance the remainder. This makes them characteristically identifiable. With thorium, however, once processed, it will re-establish its natural configuration by radioactive action in about 20 years, making it indistinguishable from other, unprocessed, thorium, especially natural thorium in local soils and fill. Thus, we cannot differentiate an atom of naturally present thorium from Lindsay Light generated thorium.

However, the Lindsay Light wastes exhibit high concentrations of thorium-232 and radium-228 which were present in the monazite ore that Lindsay Light extracted thorium from. These levels are usually much higher than natural radioactivity in soils and fill in the Streeterville area. High concentration wastes circumstantially indicate Lindsay Light as a source because, to our knowledge, nobody else in the area was handling high level thorium ore.

There are other nonradioactive metals in the ore that would also have much higher concentrations in ore wastes than in local soils and fill. Many of these are called rare earths.

Although these are not as easily measured as are radioactive materials, they could be measured if necessity required it so that Lindsay Light could be linked to radioactive wastes.

In addition, all of the locations in question are near the thorium ore extraction site (River East, a/k/a Lindsay Light II). The extraction process generated large amounts of ore tailings. These tailings were likely disposed of near to the plant in order to minimize disposal costs. The removal actions taken at River East and Grand Pier (N. Columbus Drive) are a direct result of thorium ore tailing disposal.

Regulatory background. A variety of federal statutes authorize the regulation of radionuclide use and management to protect human health and the environment. Under these statutes, U.S. EPA, Nuclear Regulatory Commission and Department of Energy are the federal agencies with primary regulatory authority for radioactive materials. The Illinois Department of Nuclear Safety also regulates certain licensed facilities. The Lindsay Light facility generated the radioactively-contaminated material prior to the enactment of the Atomic Energy Act (1954), however, and there were no regulations governing the management of this material prior to that time. In addition, few federal radiation protection regulations expressly apply to the cleanup of radioactively contaminated sites. Generally, they apply to licensed facilities such as the former Rare Earths Facility that Kerr-McGee operated in the City of West Chicago.

The IDNS has stated to the U.S. EPA that they recognize the authority of the City of Chicago to conduct the building inspections, but, at this time, see no role for the State in the City of Chicago's investigation.

U.S. EPA CERCLA Response Authority. As you know, U.S. EPA cleans up or oversees cleanup of uncontrolled hazardous waste sites under the Superfund program established by the Comprehensive Environmental Compensation, Response and Liability Act of 1980 as amended ("CERCLA"). CERCLA provides U.S. EPA with authority to respond to releases of hazardous substances which are defined to include all radionuclides. Note that the response authority is limited to "release[s] into the environment" which restricts the agency's ability to compel a cleanup when contamination is contained entirely within a building and there are no potential releases into the environment.

Cleanup Levels. CERCLA 121(d) requires that any contaminants left on site must meet or exceed state and federal applicable or relevant and appropriate promulgated requirements (ARARs). "To-be-considered" material are non-promulgated advisories or guidance issued by state or federal agencies. The "to-be-considered" material is considered along with the ARARs as part of the site risk assessment and may be used in determining the necessary level of cleanup to protect human health and the environment.

The primary ARAR for soil cleanup levels comes from Title 40, Part 192, subparts B and E, of the Code of Federal Regulation (40 CFR 192, Health and Environmental Protection

Standards for Uranium and Thorium Mill Tailings) as interpreted by U.S. EPA guidance. There are two different standards for surface and subsurface soils, 5 picocuries per gram (pCi/g) for surface soils and 15 pCi/g for subsurface. The higher subsurface number was not based upon health concerns but as a cost-effective tool to locate and remediate subsurface contamination that was primarily 30 (pCi/g) and higher. This is not an appropriate cleanup level where there is significant subsurface contamination between 5 and 30 (pCi/g) at mill tailing sites. U.S. EPA can not use the 15 pCi/g standard in 40 CFR 192 in Streeterville because it does not have a health basis. The criterion U.S. EPA uses for thorium contaminated soils at Lindsay Light sites in the Streeterville area is 5 picocuries per gram (pCi/g) over background for total radium (radium-226 + radium-228) in any 15 centimeter (6 inch) soil layer, averaged over 100 square meters (1076 square feet). With background at 2.1 pCi/g, the functional soil cleanup criterion is 7.1 pCi/g, including background, averaged over 100 square meters.

If groundwater were assessed, the radiation standards of 40 CFR 141 could be Relevant and Appropriate criteria.

For indoor air quality, the radiation standards of 40 CFR 192 may be Relevant and Appropriate criteria and the U.S. EPA's indoor radon guidance could provide to-be-considered criteria. These could be adapted to thorium's radon through the use of Report 32 of the International Commission on Radiological Protection. Radon-222 concentrations may be compared to (1) the U.S. EPA's indoor guideline of 4 picocuries per liter or (2) to the effluent concentration of 10 CFR 20, Appendix B, Table 2, Column 1, with daughters present, namely  $1\text{E}-10$  microcuries per milliliter. Radon-222 decay product concentrations may be compared to the indoor remedial action concentration listed in 40 CFR 192.12(b)(1) of 0.02 working levels. Radon-220 concentrations may be compared to (1) the equivalent of 4 picocuries per liter radon-222 or (2) to the effluent concentration of 10 CFR 20, Appendix B, Table 2, Column 1, with daughters present, namely  $3\text{E}-11$  microcuries per liter. Radon-220 decay product concentrations may be compared to the equivalent of 0.02 working levels radon-222 relying on guidance in publication 32 of the International Commission on Radiological Protection.

Depending upon the survey results, there may be a need to evaluate measured levels against other appropriate standards, criteria or guidelines.

Indoor Contamination Measurements. You inquired as to how U.S. EPA will measure radiation levels in the buildings on the 200 block of E. Grand Ave. U.S. EPA will measure exposure rate, dose rate, and concentrations of radon-220 and radon-222. This will be done with hand held meters and with passive monitors left in the building for several days.

Exposure rate will be used to assess consistency and variation of the gamma ray levels within the building. This will aid in focusing on what is normal and what is anomalous, for the

purpose of further assessments. There are no standards that will be applied to exposure rate. These measurements will be done with a hand held meter.

Dose rate will be measured and may be used (1) for comparison to the indoor gamma radiation level of Title 40, Part 192.12(b)(2) [or 40 CFR 192.12(b)(2)]; (2) to compute the associated risk for comparison to the excess upper bound lifetime cancer risk range of the National Oil and Hazardous Substances Pollution Contingency Plan at 40 CFR 300.430(e); (3) to compute the annual dose for comparison to the effective dose equivalent limit of OSWER Directive No. 9200.4-18; or (4) to compute the total effective dose equivalent standard for individual members of the public found in 10 CFR 20.1301 or the equivalent in 32 Illinois Administrative Code: Chapter II. These are, respectively, 20 microroentgens per hour over background;  $10^{-6}$  to  $10^{-4}$ ; 15 millirem per year, over background; and 0.1 rem per year, over background. Dose rate will be measured with a hand held meter.

Radon-222 concentrations may be compared to (1) the U.S. Environmental Protection Agency's indoor guideline of 4 picocuries per liter or (2) to the effluent concentration of 10 CFR 20, Appendix B, Table 2, Column 1, with daughters present, namely  $1\text{E}-10$  microcuries per milliliter. Radon-222 decay product concentrations may be compared to the indoor remedial action concentration listed in 40 CFR 192.12(b)(1) of 0.02 working levels.

Radon-220 concentrations may be compared to (1) the equivalent of 4 picocuries per liter radon-222 or (2) to the effluent concentration of 10 CFR 20, Appendix B, Table 2, Column 1, with daughters present, namely  $3\text{E}-11$  microcuries per liter. Radon-220 decay product concentrations may be compared to the equivalent of 0.02 working levels radon-222 relying on guidance in publication 32 of the International Commission on Radiological Protection. Radon measurements will be made with passive monitors left in the building for approximately seven days.

Lindsay Light Building and 2XX Block E. Grand Av. With respect to your questions about thorium contamination in buildings in Streeterville, please note that the 161 E. Grand building, a/k/a the Lindsay Light Building, was the headquarters and manufacturing facility for the Lindsay Light Company. The 161 E. Grand building was surveyed by this Agency in the early 1980s and again in the early 1990's. Both times, U.S. EPA detected thorium contamination. A review of dosimetry data for the Lindsay Light Building by Larry Jensen (Regional Radiation Expert) and Patricia Van Leeuwen (Superfund Toxicologist) concluded, on September 29, 1993, that a designation of imminent and substantial endangerment would be warranted based upon projected risk levels.

A public health threat was established for the Lindsay Light Building through a data review provided by the Agency for Toxic Substances and Disease Registry (ATSDR) on

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September 14, 1993, when they recommended an office either be evacuated or sealed due to gamma-ray levels.

Other buildings in the area may also be contaminated but U.S. EPA cannot determine whether or not thorium contamination exists in these buildings until the properties are inspected. This Agency has requested access to these properties pursuant to CERCLA 104(e) so that testing can be conducted. As you know, the buildings located on the 200 block of E. Grand are immediately adjacent to the Grand Pier development that required a thorium removal action. These buildings were possibly constructed on contaminated fill from Lindsay Light or may have been the site of Lindsay Light manufacturing or storage activities.

We plan to survey the buildings with exposure rate meters. Dose rate measurements will be taken with hand held meters as well. Radon-220 and radon-220 concentrations will also be measured with passive monitors left about a week.

What if Standards are Exceeded? If standards, criteria or guidelines are not met, the U.S. Environmental Protection Agency will evaluate the results in consultation with the Agency for Toxic Substances and Disease Registry and make a recommendation to the City of Chicago with regard to the public health risk and whether that may constitute an imminent and substantial endangerment.

If a determination is made that there is a public health risk, there may be a need for corrective action.

If you have more questions, please call me at (312) 886-4683 or Cathy Martwick, Associate Regional Counsel, at (312) 886-7166. Please direct technical questions to Fred Micke at (312) 886-5123; Verneta Simon, On-Scene Coordinator, at (312) 886-3601; or Larry Jensen, Senior Health Physicist, at (312) 886-5026.

Sincerely,



Mary Fulghum  
Associate Regional Counsel

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